

What is claimed is:

1. An implantable delivery device for intraocular delivery comprising:
a non-linear shaped body member having a proximal end and a distal end;
a lumen extending through the coil shaped body member for housing a substance to be delivered;
a delivery mechanism for delivery of the substance, whereby the non-linear shape of the body member provides an increased surface area per length of the device through which drug delivery occurs.
2. The delivery device of claim 1 wherein the member has multiple angles.
3. The delivery device of claim 1 or 2 wherein the body member is coil-shaped.
4. The delivery device of any one of claims 1 through 3 further comprising a port near the proximal end of the non-linear shaped body member for introducing the substance to the lumen.
5. The delivery device of any one of claims 1 through 4 further comprising a rim or cap at the distal end of the device for stabilizing the device at a desired delivery area wherein the non-linear shaped body member is inserted into the eye until the rim or cap abuts the outer surface of the eye.
6. The delivery device of claim 5, wherein the rim or cap includes one or more holes for suturing the device to the eye.
7. The delivery device of claim 5 or 6 wherein the rim or cap is fabricated of a pliable material.

8. The delivery device of any one of claims 5 through 7 wherein the rim or cap is fabricated of a material selected from, silicone elastomers and rubbers, polyolefins, polyurethanes, acrylates, polycarbonates, polyamides, polyimides, polyesters, and polysulfones.

9. The delivery device of any one of claims 1 through 8 wherein the device comprises a delivery mechanism comprises at least one exit aperture located at the distal end of the non-linear shaped body member.

10. The delivery device of claim 9 wherein the size and/or number of the at least one exit aperture controls the rate of delivery of the substance.

11. The delivery device of claim 9 or 10 further comprising a mechanism for controlling the rate of delivery of the substance through the at least one exit aperture.

12. The delivery device of any one of claims 9 through 11 wherein the mechanism for controlling the rate of delivery of substance comprises a porous lining, a matrix material, a diffusion-limiting material or rate-limiting membrane that covers the at least one exit aperture.

13. The delivery device of any one of claims 1 through 8 wherein the device comprises a delivery mechanism comprises a plurality of openings along the coil shaped body member.

14. The delivery device of claim 13 wherein the size and/or number of the at least one openings controls the rate of delivery of the substance.

15. The delivery device of any one of claims 1 through 8 wherein the device comprises a delivery mechanism comprises a permeable or semi-permeable material forming at least a portion of the non-linear shaped body member.

16. The delivery device of claim 15 wherein the percentage of the non-linear shaped body member fabricated of a permeable or semi-permeable material controls the rate of delivery of the substance.

17. The delivery device of claim 15 wherein the permeability of the material to the substance controls the rate of delivery of the substance.

18. The delivery device of claim 15 wherein the permeable or semi-permeable material is selected from polycarbonates, polyolefins, polyurethanes, copolymers of acrylonitrile, copolymers of polyvinyl chloride, polyamides, polysulphones, polystyrenes, polyvinyl fluorides, polyvinyl alcohols, polyvinyl esters, polyvinyl butyrate, polyvinyl acetate, polyvinylidene chlorides, polyvinylidene fluorides, polyimides, polyisoprene, polyisobutylene, polybutadiene, polyethylene, polyethers, polytetrafluoroethylene, polychloroethers, polymethylmethacrylate, polybutylmethacrylate, polyvinyl acetate, nylons, cellulose, gelatin, silicone rubbers and porous rubbers.

19. The delivery device of any one of claims 1 through 8 wherein the device comprises a delivery mechanism that comprises a biodegradable polymeric material forming at least a portion of the non-linear shaped body member.

20. The delivery device of claim 19 wherein the biodegradable polymeric material contains microparticles of the therapeutic agent to be delivered.

21. The delivery device of any one of claims 1 through 21 wherein the distal end of the body member is adapted for piercing the eye during insertion into the eye.

22. The delivery device of claim 22 wherein the body member distal end is pointed or beveled.

23. The delivery device of any one of claims 1 through 22 wherein the cross-sectional shape of the non-linear shaped body member is circular.

24. The delivery device of any one of claims 1 through 23 wherein the device may be inserted through an incision requiring few or no sutures for closure.

25. The delivery device of claim 24 wherein the largest cross-section dimension of the member is from about 0.25 mm to about 1 mm.

26. The delivery device of claim 24 wherein the largest cross-section dimension of the body member is from about 0.25 mm to about 0.5 mm.

27. The delivery device of any one of claims 1 through 26 wherein the port near the proximal end of the body member forms a seal about the needle of a syringe or injection mechanism used to introduce the substance to the lumen.

28. The delivery device of any one of claims 1 through 26 further comprising a collar mounted about the distal end of the body member through which the needle of a syringe or injection mechanism may be inserted and which forms a seal about the needle of a syringe or injection mechanism.

29. The delivery device of any one of claims 1 through 28 wherein the port near the proximal end of the body member is fabricated of an injectable self-sealing material.

30. The delivery device of claim 29 wherein the injectable self-sealing material is selected from silicone rubber, silicone elastomers and polyolefin.

31. The delivery device of any one of claims 1 through 30 wherein the body member is fabricated of a flexible material that prevents small movements of the delivery device from being translated to the retina.

32. An implantable delivery device for intraocular delivery comprising a coil shaped body member having a proximal end and a distal end.

33. The delivery device of claim 32 wherein at least a portion of the coil shaped body member fabricated of a biodegradable polymeric material containing microparticles of the substance to be delivered, whereby as the polymeric material decomposes, the substance is delivered.

34. An implantable delivery device for intraocular delivery comprising:
a non-linear shaped body member having a proximal end and a distal end; and
a plurality of lumens extending through the body member for housing at least one substance to be delivered.

35. The delivery device of claim 34 wherein the device further comprises a delivery mechanism for delivery of the substance.

36. The delivery device of claim 34 or 35 wherein the body member is coil-shaped.

37. The delivery device of any one of claims 34 through 36 further comprising a plurality of ports, each in fluid communication with a corresponding lumen for introducing the substance to each of the lumens.

38. An ocular drug delivery device comprising:
a non-linear shaped body member that has a shape other than a substantially C-configuration.

39. The delivery device of any one of claims 1 through 38 wherein the non-linear shaped body member is fabricated of a cluster of hollow tubes formed into a non-linear shape, each tube having a lumen for housing at least one substance to be delivered.

40. The delivery device of claim 39 wherein the lumen is divided into a plurality of compartments along the length of the lumen by at least one impermeable divider.

41. The delivery device of claim 40 wherein a different substance is inserted and housed within each of the plurality of compartments.

42. The delivery device of claim 40 or 41 wherein the plurality of compartments may each be selectively opened by a laser for delivery of the substance within each compartment.

43. The delivery device of any one of claims 1 through 42 further including a backbone extending through at least a portion of the non-linear shaped body member for added structural support of the non-linear shaped body member.

44. The delivery device of any one of claims 32 through 43 wherein the device may be inserted through an incision requiring few or no sutures for closure.

45. The delivery device of claim 44 wherein the largest cross-section dimension of the body member is from about 0.25 mm to about 1 mm.

46. The delivery device of claim 44 wherein the largest cross-section dimension of the body member ranges from about 0.25 mm to about 0.5 mm.

47. The delivery device of any one of claims 1 through 46 wherein at least a portion of the body member is fabricated of a shape memory material, whereby the body member may be deformed into a shape that allows easier insertion of the device into the eye and whereby the device returns to a non-linear remembered shape after insertion in the eye.

48. The delivery device of any one of claims 1 through 47 wherein the body member has a backbone fabricated of a shape memory material, whereby the body member may be deformed into a shape that allows easier insertion of the device into the eye and whereby the device returns to a non-linear remembered shape after insertion in the eye.

49. An implantable delivery device for intraocular delivery comprising:
a body member having a proximal end and a distal end;
at least a portion of the body member fabricated of a shape memory material;
whereby the remembered shape of the body member is non-linear, and whereby the body member may be deformed into a shape that allows easier insertion of the device into the eye and whereby the device returns to its non-linear remembered shape after insertion in the eye.

50. The delivery device of any one of claims claim 47 through 49 wherein the remembered shape of the body member is a coil shape.

51. The delivery device of any one of claims 47 through 50, wherein the shape memory material is selected from shape memory alloys and shape memory polymers.

52. A device for drug delivery comprising:
a body member having a maximum cross-section dimension of from about 0.25 mm to about 1 mm.

53. The delivery device of claim 53 wherein the maximum cross-section dimension of the body member is from about 0.25 mm to about 0.5 mm.

54. The delivery device of claim 52 wherein the maximum cross-section dimension of the body member is from about 0.25 mm to about 0.4 mm.

55. The delivery device of any one of claims 52 through 54 wherein the device is implantable with a human eye.

56. A medical device kit, comprising one or more of the delivery devices of any one of claims 1 through 55.

57. The kit of claim 56 wherein the one or more delivery devices are packaged in sterile condition.

58. A method for delivery of a therapeutic agent to a patient's eye comprising:
(a) providing a delivery device of any one of claims 1 through 54 wherein the device contains a therapeutic agent; and
(b) inserting the device into a patient's eye.

59. The method of claim 58 wherein after insertion of the device, the therapeutic agent enters the patient's eye.

60. The method of claim 58 or 59 wherein the therapeutic agent is administered intraocularly to the patient.

61. A method for delivery of a substance intraocularly, comprising:
(a) providing a sustained release delivery device comprising:
a non-linear shaped body member having a proximal end and a distal end;
a lumen extending through the non-linear shaped body member for housing a substance to be delivered;
a delivery mechanism for delivery of the substance;
(b) making an incision in a patient's eye to access a treatment area;
(c) inserting the delivery device into the treatment area through the incision distal end first;
(d) allowing the substance to travel out of the lumen and to the eye through the delivery mechanism;

(e) removing the delivery device from the treatment area.

62. A method for delivery of a substance intraocularly, comprising:

(a) providing a sustained release delivery device comprising:

a non-linear shaped body member having a proximal end and a distal end;

a lumen extending through the non-linear shaped body member for housing a substance to be delivered;

a delivery mechanism for delivery of the substance;

a port at the distal end of the non-linear shaped body member for injection of the substance into the lumen;

(b) making an incision in a patient's eye to access the treatment area;

(c) inserting the delivery device into the treatment area through the incision distal end first such that the port remains outside the incision;

(d) using an injection mechanism to inject the substance into the lumen through the port;

(e) removing the injection mechanism from the port and closing off the port;

(f) allowing the substance to travel out of the lumen and to the patient through the a delivery mechanism;

(g) optionally repeating steps (d) through (f) one or more times; and

(h) removing the delivery device from the treatment area.

63. The method of claim 58 through 62 wherein the body member is coil-shaped and wherein the step of inserting the delivery device into the treatment area through the incision distal end first comprises twisting the coil-shaped body member in through the incision.

64. A method for delivery of a therapeutic agent comprising inserting a delivery device of any one of claims 1 through 54 into a patient ocular treatment area and allowing the delivery mechanism to deliver the substance to a treatment area at a desired rate.

65. A method for the treatment of ocular conditions in patients comprising utilizing the delivery device of any one of claims 1 through 54 to deliver one or more therapeutic agents to the eye of the patient.

66. The method of any one of claims 58 through 64 wherein at least a portion of the body member is fabricated of a shape memory material, the method further comprising the step of, prior to insertion of the device into the eye, deforming the body member into a shape that allows easier insertion of the device into the eye, whereby after the device is inserted into the eye the device returns to a non-linear remembered shape.

67. The method of claim 65 or 66 wherein the member has a substantially coil configuration.